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## Distribution and habitat selection of *Buteo polyosoma* and *B. poecilochrous* in Bolivia and neighbouring countries

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Received 6 February 1991

*Buteo polyosoma* and *B. poecilochrous* are two South American hawks with overlapping ranges. The distribution of the former includes the range of the latter. *B. polyosoma* occurs in central Colombia (perhaps only as a migrant; Hilty & Brown 1986), the Pacific lowlands and Andean regions of Ecuador and Peru, Andean and Chaquean regions of Bolivia (Cabot & Serrano 1986, 1988), mountains and pre-Andean hills of western Argentina to Tierra del Fuego, the Malvinas, and locally in Córdoba and Buenos Aires Provinces, Chile (south to Cape Horn), Paraguay, and possibly accidentally in Uruguay and Brazil. The subspecies *exsul* inhabits the Juan Fernandez Islands (Blake 1977). *B. poecilochrous* is distributed in the high chains and altiplanos of the Andes from southwestern Colombia (also considered as a possible migrant; Hilty & Brown 1986) to northwestern Argentina and northern Chile (Blake 1977).

The two species overlap in size. In general *B. poecilochrous* is larger than *B. polyosoma*, but the female of the latter is about the same size as the male of the former. Furthermore, the two demonstrate similarity and variability in plumage types. *B. polyosoma* has five plumage types (Vaurie 1962), four of them virtually duplicated in *B. poecilochrous*. The overlapping geographical distributions and sizes of the two species, the similarity and variability of their plumages and the lack of field studies of both species have led some authors, in the past, to consider *B. poecilochrous* as individual variants (Hellmayr & Conover 1949) or an altitudinal form (Amadon in Vaurie 1962) of *B. polyosoma*. Also the paucity of reliable sex data on the labels of museum specimens has added to the confusion.

On the basis of museum skins Chapman (1926), Hellmayr (1932), Hellmayr (in Hellmayr & Conover 1949) and Vaurie (1962) take the wing formulae (Stresemann 1925) to be a valid criterion for identification in the hand. The criterion is that the 3rd primary is usually longest along with the 5th in *B. polyosoma*, but in *B. poecilochrous* the 5th is not always longer than the 3rd.

In the first part of this paper the flight features of each species are presented, for field identification. In the second part, the distribution and selection of habitats in Bolivia and neighbouring countries are discussed. For flight identification observed features are presented, on the basis of silhouettes and measurements of skins in the Museo Nacional de Ciencias Naturales de Madrid and Estación Biológica de Doñana. Data on habitat selection and distribution were obtained in the course of field work in 1981–86 and August 1988 in several Bolivian departments, also from Bolivian specimens in the collections of Museum Zoology of Louisiana State University (LSUMZ) and from the literature.

### Flight identification

Some authors consider the two species indistinguishable in the field (Meyer de Schauensee 1970, Hilty & Brown 1986), perhaps due in part to the difficulty that has existed in their hand identification, combined with a lack of experience with their silhouettes. Cabot & Serrano (1986) mention some features that allow differentiation of the species by their silhouettes in flight. These are presented here in more detailed form.

The traits which characterize each species are as follows:

*B. polyosoma*—Graceful silhouette (Fig. 1a). The wings (more slender and rectilinear than *B. poecilochrous*) appear long in relation to the width; the anterior and posterior edges of the wing tend to be more or less parallel, with a less rounded configuration. The tail appears to be longer due to the relative narrowness of the wing and to its rectangular form, even though in reality it is shorter than the tail of *B. poecilochrous*; that the tail tends normally to maintain a rectangular form may also influence this perception.

*B. poecilochrous*—Wings large and wide, tail appearing relatively shorter and rounded (Fig. 1b). The posterior edge of the wing is usually curved, giving the wing a more or less rounded outline; this roundness of the wing has been mentioned by Dorst (1956). The tail protrudes little; it is usually slightly open, appearing wedge-shaped, the distal edge rounded. The sharp angle between the lateral edge of the tail and the rear edge of the wing is characteristic.

The measurements presented in Table 1 corroborate the above points. *B. poecilochrous* surpasses *B. polyosoma* by 15% in both total length and wing-span. *B. poecilochrous* also has wider wings than *B. polyosoma*, since its secondaries are both absolutely and proportionally longer.

### Distribution and habitat selection in Bolivia

Localities where the two species were recorded are listed for each department, from north to south (Figs 2 and 3). Records of more than one

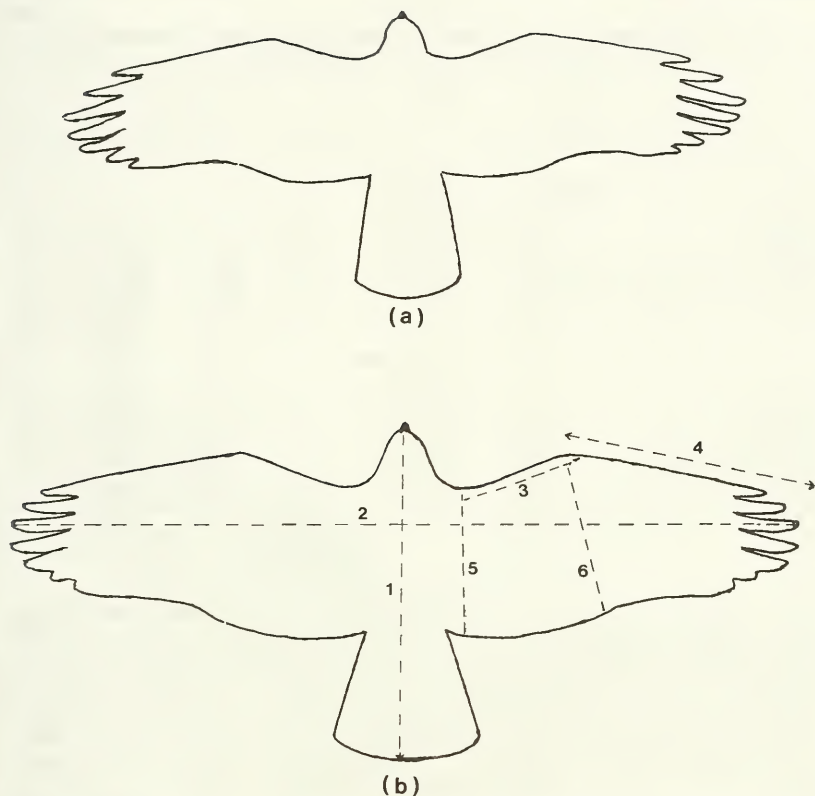


Figure 1. Flight silhouettes of *Buteo polyosoma* (a) and *B. poecilochrous* (b), based on the following measurements (Table 1): 1, total length; 2, wing-span; 3, forearm length; 4, wing length; 5, innermost secondary length; 6, outermost secondary length.

individual in a locality are noted. In the Andean region records are allocated in three life zones. (1) Cordillera: slopes and valleys on the crest of the eastern Andean chain to perpetually snow-covered mountain-tops, above 4500 m. (2) Puna: rolling hills, groups of hills and plains on the Altiplano (the inter-Andean plateau), between 3700 and 4500 m. (3) Mesothermic valleys: drier intermontane valleys of the eastern Andes, with xeromorphic vegetation, principally scrub and trees generally near water courses; from 1000 to 3600 m. These valleys have been extensively deforested.

### *B. polyosoma*

La Paz Dpt.

1: Ulla-Ulla Reserve, 4600 m; high puna, moraine hills near cordilleran zone, short alpine grass, 22 Jul 1982. 2: Tiawanacu, 3800 m; semi-arid puna, stony hills and plains, tussock grass, some areas dotted with thola scrub (*Lepidophyllum*) and some fields of potatoes on the slopes, 3 Sep 1983. 3: Achuma de Santa Ana, c. 45 km SW of Viacha, 4000 m; puna, gentle

TABLE 1  
Average and range of measurements of *Buteo polyosoma* and *B. poecilochrous*

| Lengths                 | $\bar{x}$ | Male range | n  | $\bar{x}$ | Female range | n |
|-------------------------|-----------|------------|----|-----------|--------------|---|
| <i>B. polyosoma</i>     |           |            |    |           |              |   |
| Total                   | 475       | 470–480    | 2  |           |              |   |
| Wing-span               | 1130      |            | 2  |           |              |   |
| Forearm                 | 121.1     | 115–128.5  | 18 | 130.5     | 129–132      | 2 |
| Wing                    | 370       | 350–392    | 18 | 391       | 390–392      | 2 |
| Innermost secondary     | 158       | 140–174    | 18 | 175       | 167–184      | 2 |
| Outermost secondary     | 189       | 180–202    | 18 | 201.5     | 200–203      | 2 |
| Tail                    | 190       | 173–212    | 18 | 217       | 211–223      | 2 |
| <i>B. poecilochrous</i> |           |            |    |           |              |   |
| Total                   | 550       | 540–565    | 3  | 572       |              | 1 |
| Wing-span               | 1310      |            | 1  | 1390      |              | 2 |
| Forearm                 | 136.8     | 130–143.5  | 8  | 144       | 139.2–150.5  | 8 |
| Wing                    | 421.6     | 402–444    | 8  | 461       | 446–474      | 8 |
| Innermost secondary     | 200.1     | 184–215    | 8  | 214.5     | 199–222      | 8 |
| Outermost secondary     | 236.7     | 223–248    | 8  | 257.2     | 243–263      | 8 |
| Tail                    | 215.9     | 190–228    | 8  | 237.3     | 225–265      | 8 |

slopes, thola scrub on the slopes and tussock grass on low ground, 10 Mar 1983. 4: Viacha, 3840 m; puna, extensive plains with gentle slopes, tussock grass, 1 Sep 1941, LSUMZ 37061. 5: Palca, 3200 m; mesothermic valley, eroded steep slopes and gullies in valley bottom, fields and scattered *Eucalyptus* trees in low parts and bushes and tussock grass on the slopes, 20 Jan 1982 and 21 Jul 1984. Previously recorded in this locality by Lafresnaye & D'Orbigny (in Chapman 1926). 6: Animas, 4 km SW La Paz city, 3700 m; mesothermic valley, habitat similar to 5, 13 Nov and 9 Dec 1983. 7: Rio Abajo, near La Paz city, 3200 m; mesothermic valley, habitat similar to 5, many observations 1982–1984. 8: Patacamaya, 3900 m; puna, rolling stony plains, tussock grass and thola scrub, 23 Jun 1984. 9: Huachacalla, 3870 m; puna, plains with thola scrub, 10 Nov 1984. 10: Campero, 3800 m; puna, habitat similar to above.

#### Cochabamba Dpt.

11: Parque Nacional Tunari, 12 km NE of Cochabamba, 3000 m; mesothermic valley, steep slopes with *Polylepis* woods and tussock grass, 14 Apr 1984 (two immatures) and 4 May 1985. 12: Near Cochabamba city, 2500 m; mesothermic valley, gentle slopes, thorny shrubs and scattered leguminous and pepper trees (*Schinus molle*) alternating with fields, 25 Aug 1988. Previous records are 37062 and 37063 LSUMZ of Jan 1957 and 15 Jul 1939 respectively. 13: km 130 on the Cochabamba road to Santa Cruz de la Sierra, 3700 m; puna, transition with mesothermic valley, steep slopes with *Polylepis* woods and fields in the low parts, 2 Jun 1986. 14: Near Laguna Urkupiña, 4 km S of Quillacollo, 2500 m; mesothermic valley, hills with thorny scrub and columnar cacti, scattered trees. Three birds together May 1985, and one Oct 1985. 15: Between Cochabamba and Santibañez, 2500 m; habitat similar to above, 22 May 1985. 16: La Angostura, 20 km S of Cochabamba city, 2600 m; habitat similar to above, 14 May 1984 and 19 May 1985. 17: Arani (Fjeldså 1987), 3200 m; mesothermic valley, small fields surrounded by arid stony terrain with little grass and scattered bushes, some cacti and a few leguminous trees, 15–16 Apr 1987. 18: Llavini, 3500 m; high parts of mesothermic valley, arid and stony mountain slopes with *Polylepis* trees, tussock grass and scattered bushes, 21 Jan 1986. 19: Cerro Keñua-Sandra (Fjeldså 1987), 3900 m; high parts of mesothermic valley, mountains with dry bushy slopes and *Polylepis* trees, 12–14 Apr 1987. 20: Totora, mesothermic valley, 2603 m; hills with stony slopes with tussock grass, small fields and scattered trees, 22 Jun 1985. 21: Julpemayu, 2000 m; mesothermic valley, mountains with hanging slopes, narrow valleys and eroded gorges, heavy covering of leguminous trees, dense thorny thicket and columnar cacti, 21 Jun 1985. 22: Near Mizque



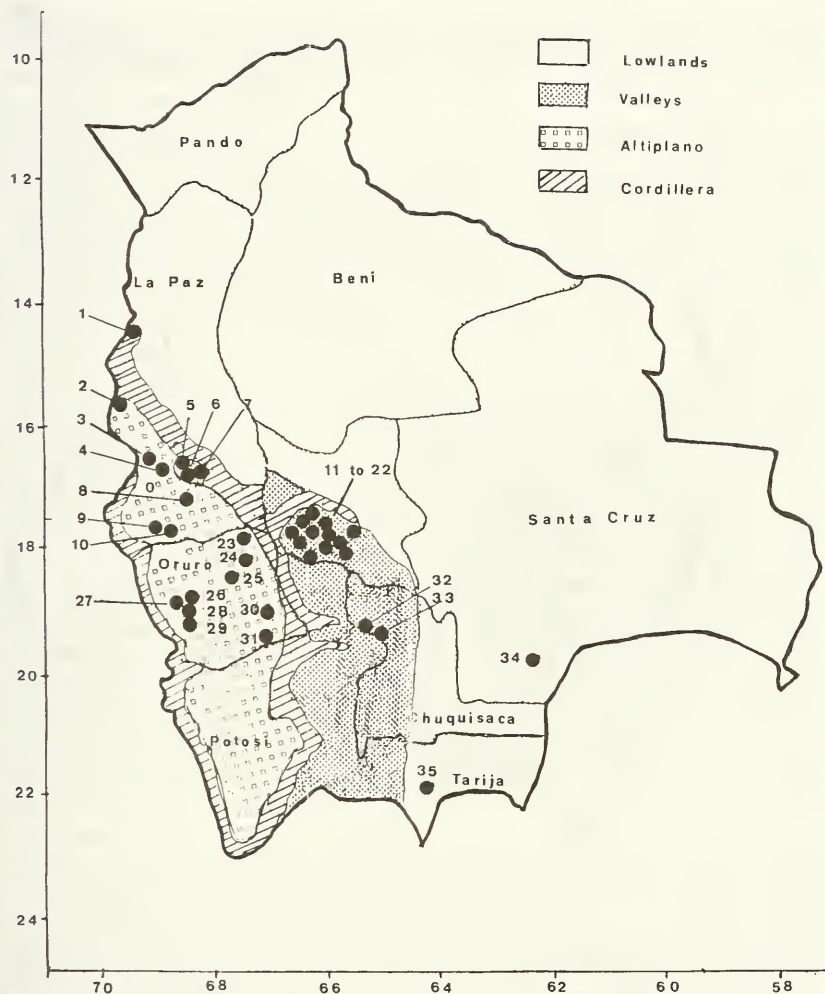


Figure 2. Bolivian localities where *B. polysoma* has been recorded.

(Fjeldså 1987), 3100–3600 m; mesothermic valley, gully with dense thickets of *Polylepis* and other bushes, trees and mistletoes, 17 Apr 1987.

#### Oruro Dpt.

23: Caracollo, 3850 m; puna, rolling stony terrain with thola and tussock grass, two birds, Apr 1983 and 16 Mar 1984. 24: between Oruro and Lago Uru-Uru, 3700 m; puna, humid salt-flat plains, scattered short halophytes, 18 Aug 1984. 25: Toledo; puna, same altitude, habitat and date as previous locality. 26: Laguna Kasilla, 3600 m; puna, rolling arid stony terrain and low hills with thola shrubbery and tussock grass, 20 Aug 1984. 27: Opoquere; puna, same altitude, habitat and date as preceding locality. 28: Andakare; puna, same habitat and date as preceding localities. 29: Sabaya, 3900 m; puna, salt plains with tussock grass and short halophytes, 18 Aug 1984. 30: Challapata, 3650 m; puna, humid plains with

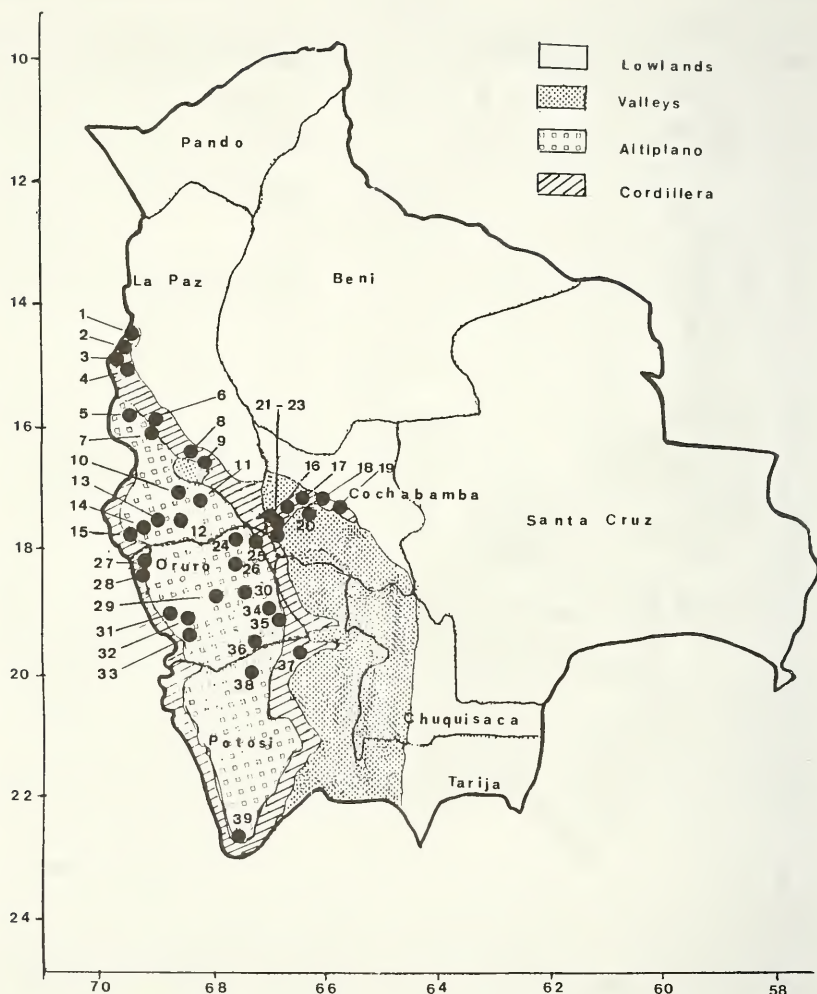


Figure 3. Bolivian localities where *B. poecilochrous* has been recorded.

surrounding hills, short grass and tussocks, two birds, not together, 28 Jun 1984. 31: Sevaruyo, 3700 m; puna, plains with tussock grass and bogs, two birds, not together, 28 Jul 1984.

#### Chuquisaca Dpt.

32: 30 km S of Sucre city, 3000 m; mesothermic valley, mountains with steep slopes, degraded vegetation with fields and thorny scrub, scattered trees of *Prosopis*, *Acacia* and pepper trees, and small fields, 25 Jul 1984. 33: 20 km on the road to Sucre from Cochabamba, 2900 m; mesothermic valley, same habitat and date as preceding locality.

#### Santa Cruz Dpt.

34: Cerro Colorado (19°50'S, 62°21'W), 400 m; Chaco, in scattered rocky hills on an extensive plain, thorny thickets, columnar cacti and scattered trees on the slopes, 17–19 Sep 1986.

## Tarija Dpt.

35: Tatarenda (21°50'S, 63°37'W), 600 m; Chaco, on the border between tropical forest and dry woodland, open areas marshy during the wet season and afterwards dry and covered with grass, Mar 1902 (Lönnberg 1903).

**B. poecilochrous**

## La Paz Dpt.

1: Katantica, Pelechuco pass, 4600–5000 m; cordillera, on the crest of the mountains, cliffs and steep rocky slopes; high alpine vegetation, bogs in the humid bottom. Common all year, on many occasions in pairs, 1981–1982. 2: Plains of Ulla-Ulla, 4400 m; high puna, extensive plains near Cordillera Apolobamba, with some low hills, stony ground with some humid areas, short alpine grass. Rare, especially during the austral summer, some observations between 1981–1982, usually circling above hills, some in pairs. 3: Charazani and Curva pass, 4600–4900 m; cordillera, same habitat, vegetation, date and status as locality 1. 4: Huila-K'hala, 4400 m; high puna, mountains near Cordillera Apolobamba with rounded peaks, steep slopes and deep valleys, short tall grass prairie with some tussock grass, Jan 1981. 5: Katacora, near Lake Titicaca, 3800 m; puna, with rocky hills and stony plains, tussock grass and other growth. One pair associated with a cliff, 18 Nov 1984. 6: Zongo pass, 4800 m; cordillera, high mountains with sheer and steep slopes, high alpine vegetation, 8–10 Apr 1987 (Fjeldsø 1987). 7: Peñas, between La Paz and Lake Titicaca, 4000 m; puna, stony and rocky slopes, tussock grass and other scattered growth, 8 Apr 1984. 8: La Cumbre, Yungas pass, 4900 m; cordillera, on the crest of the mountains, steep rocky slopes and deep steep valleys with humid bottoms. Habitat and vegetation similar to localities 1, 3 and 7. Several summer and winter observations 1981–1986, some in pairs. 9: Palca, 3900 m; puna, between the cordilleran zone and mesothermic valley, rounded mountains, steep slopes and narrow valleys, tussock grass and some potato fields, 23 Jul 1984. 10: Comanche, 4100 m; puna, rounded hills with stony slopes and cliffs in high parts, tussock grass, thola shrubs and *Puya raimondii* on hillsides. Several summer and winter observations of a pair settled on a cliff, two adults with fledging chick on 6 Mar 1984. 11: 30 km S of La Paz city, 3800 m; puna, rolling stony plains, poor vegetation of bunch grass and scattered thola shrubs, 7 Jan 1984. 12: Esperanza, on Río Viscachani, 4200 m; puna, no habitat description (Paynter *et al.* 1975), LSUMZ 37059 and 37060, male and female, 21 and 23 Nov 1941. 13: Sopocachi, 3800 m; arid puna, scattered rocky mountains with some cliffs on a plain, *Polylepis* trees in the high parts and thola bushes and bunch grass in lower areas. A pair settled on a cliff, 10 Nov 1984. 14: Campero, arid puna; habitat and date as previous locality. 15: Puerto Perez, 3840 m; arid puna; rocky mountains and plains, thola bushes, bunch grass and some patches of *Polylepis* on the slopes, 3 Nov 1984.

## Cochabamba Dpt.

16: Parque Nacional Tunari, 14 km NE of Cochabamba city, 4200 m; puna, rounded mountains in transition zone between the cordillera and mesothermic valley, extensive tussock grass, 17 Nov 1985. 17: 70 km E of Cochabamba city, 4050 m; puna, rounded mountains with steep slopes and deep valleys near the cordilleran zone, dense tussock grass in the high parts and small patches of *Polylepis* in the low parts and valley bottoms, 15 Sep 1988. 18: Tiraque, 4020 m, cordillera, rounded mountains with rocky areas and cliffs near extensive humid plains, short alpine grass, 1 Mar 1984. 19: 120 km E of Cochabamba city, on the road to Santa Cruz de la Sierra; 3950 m; puna, mountains with steep slopes, bunch grass in the high parts, *Polylepis* woodland in the middle and low parts, 6 Aug 1984, 2 Apr and 19 Oct 1985. 20: Parotani, 2500 m; mesothermic valley, mountains with steep eroded slopes of gravel and closed valleys, dense thorny shrub, columnar cacti and some leguminous and pepper trees, a pair Jan 1986. 21: Llavini, 54 km W of Cochabamba city, 3680 m; puna, mountains bordering mesothermic valley, pastures of bunch grass on the peaks and degraded *Polylepis* woodland in middle and lower parts, several observations between Oct 1985 and Jan 1986, some observations of pairs. 22: Cerro Sayari (Fjeldsø 1987), 4500 m; puna, mountains with some rocky outcrops and ravines, poor vegetation of composites and cacti, 12 Apr 1987. 23: Challa, near departmental limit with Oruro, 3900–4060 m; puna, mountains with smooth slopes, overgrazed pastures of bunch grass and small patches of thola, several observations 1985–1986, some birds in pairs.

## Oruro Dpt.

24: Caracollo, 3750 m; puna, stony plains and scattered hills with gentle slopes, tussock grass and thola bushes, a pair 5 May 1985. 25: Caihuasi, 4000 m; puna, arid, rocky



mountainous area in extensive plains with steep slopes and streams in valley bottoms, tussock grass and extensive thola, Dec 1985. 26: Near Lake Uru-Uru, 3700 m; puna, extensive and uniform plains with some scattered low hills, bunch grass and thola, 17 Aug 1984. 27: Sajama (Fjeldså 1987), 4300 m; puna, extensive humid grasslands surrounded by very arid country, 1 May 1987. 28: around the Bolivian border Station Tambo Quemado (Fjeldså 1987), 4300–4550 m; arid puna, pumice slopes with scattered grass, 1 May 1987. 29: Laguna Kanasa, 3900 m; puna, extensive stony plains and gentle slopes with dense growth of thola, 17 Aug 1984. 30: Callipampa (Bond & Meyer de Schauensee 1943), 3700 m; puna, low mountains, steep valleys with much outcropping, 6–13 Mar 1938. 31: Río Lauca, near Huachacalla, c. 4000 m; puna, extensive sandy flat plains with uniform cover of thola shrubbery, 20 Aug 1984. 32: Huachacalla, 3900 m; puna, extensive plains with some low hills, extensive thola shrubbery, 20 Aug 1984. 33: Near Sabaya, c. 4000 m; puna, plains and isolated low mountains, bunch grass and thola, 21 Aug 1984. 34: Upper Río Crucero (Fjeldså 1987), 3700–4000 m; puna, the high parts plains with grass and thola heath and some boggy tracts, surrounded by low hills, 23 Apr 1987. 35: Challapata, 3700; puna, plains surrounded by low hills, tussock grass and thola, 23 Apr 1984. 36: Sevaruyo, 3700 m; puna, sandy plains with extensive and uniform cover of thola shrubbery, 6 Nov 1982.

Potosí Dpt.

37: Estancia Kenkoara (Fjeldså 1987), between Potosí city and Chullpa-Khasa, 3700 m; puna, dry stony slopes with low thorny scrub and many small wheat fields, 21–22 Apr 1987. 38: Yura, 4100 m; arid puna, plains with eroded gorges with dense and uniform cover of thola shrubs, 2 Aug 1984. 39: near Laguna Colorada, 4100 m; puna, extensive desert plains with rocky hills, the plains practically devoid of vegetation, scattered patches of thola and cushion plants of yareta on the stony slopes.

To summarize, in Bolivia *B. polyosoma* has been recorded on the altiplano or puna (48.6% of recorded localities), in mesothermic valleys (45.7%) and in Chaquean lowlands (5.7%), never in high mountains on the crest of the cordillera, locality 1 being closest to the cordilleran region. On the altiplano (the inter-Andean plateau) the observations of single specimens were during the austral winter, and for this reason Cabot & Serrano (1986) suggested that migrants from more southern areas may winter there. A summer specimen (EBD 6179A), Dec 1982, identified erroneously by Cabot & Serrano (1986) as *polyosoma* has since been re-identified as *poecilochrous*. The only specimen recorded during times other than winter is an immature (EBD 3171A) on 21 Nov 1981, in the austral spring, on the shore of Lake Titicaca. In the mesothermic valleys it was recorded in the high parts, above *Polylepis* woods on the puna border, as well as the valley bottoms, in all seasons; possibly wintering birds were present in this zone. For the Chaquean region little information is available: one adult specimen in Mar 1902 (Lönnerberg 1903), two immature specimens (EBD 11210A and 11225A) on 17 and 19 Sep 1986 (Cabot & Serrano 1988) and some other single birds seen on these dates, circling above small rocky hills with poor vegetation and leguminous trees, columnar cacti and dense cover of thorny bushes alternating with open land. From the dates, these birds could also have been southern migrants.

*B. poecilochrous* is virtually restricted in Bolivia to the cordillera (12.8% of recorded localities), and the altiplano (84.6%), approximately from 3600 to the limits of permanent snow. The recording of a pair at 2500 m in a mesothermic valley bottom may be exceptional. The species has been recorded at all times of the year, frequently in pairs and associated with steep craggy places (Cabot & Serrano 1986).

On the altiplano, where both species occur, they tend to occupy different areas. *B. polyosoma* was recorded in flat areas, frequently perched



on posts or isolated rocks, while *B. poecilochrous* was seen in hilly or mountainous areas, preferably with steep slopes.

### Data on habitat selection in neighbouring countries

#### *Buteo polyosoma*

In Peru *B. polyosoma* is distributed in areas of lower elevation and occupies a greater diversity of habitats than *B. poecilochrous*. Koepcke (1954) did not cite it for the puna zone, but later (Koepcke 1964) stated that, although it is known at all altitudes of Lima Dpt., it is typically a bird of low-lying areas (the coast and lower Andean slopes). Parker *et al.* (1982) cite it as occurring in various life zones of the arid western Andean slopes from the coastal lowlands up to 3000 m, and on the eastern Andean slopes from the humid upper tropical forest (1500 m) up to the temperate humid zone (3000 m). It is not cited for the puna by these authors. Fjeldså (1987) recorded it on wastelands with crops, thickets, bushes and scattered trees usually below the altiplano.

In Argentina, according to Contreras *et al.* (1990), *B. polyosoma* emigrates from the Andean and Patagonian regions to the flat lands and subtropical regions of northern and eastern Argentina, Paraguay and possibly Uruguay; in the eastern and northern La Plata basin reaching its greatest concentrations in June, July and August and, occasionally, in October in Corrientes (Contreras, in prep.). Contreras (pers. comm.) saw one in Paraguayan Chaco, adjoining Bolivia, on 9 September 1989. Lönnberg (1903) mentioned a specimen collected in December 1902 in Moreno, on the puna of Jujuy at 3900 m, on a extensive plain surrounded by mountains which attain a maximum height of 6100 m.

#### *B. poecilochrous*

In Peru *B. poecilochrous* can be found in the same habitats as in Bolivia. Koepcke (1954) cited it in the deserts and semideserts of the altiplano and high cordillera, between 4600 and 4700 m, and on high mountain steppes between 2900 and 3200 m. She considered that it replaces *B. polyosoma* at high altitudes (Koepcke 1964). Dorst (1956, 1962) described it as a common species on the high southern plains of Peru and cited specimens collected in mountainous areas between 3900 and 4600 m. Venero & Brokaw (1980) describe it as a permanent resident, alone or in pairs, of scrubland and rocky terrain of the northern Peruvian puna, above 4000 m; and Parker *et al.* (1982) as a species exclusive to the puna from 3400 to above 4500 m. Macedo (1964) recorded a nesting pair on the altiplano, in Puno, at 3800 m; Fjeldså (1983, 1987) considers it a common bird of the Junín puna in central Peru, and in the surrounding cordilleras and hills, up to 5000 m; he recorded it in puna hills, rugged mountain areas, gently rolling hills with *Polylepis* woodlands and *Puya raimondii* stands, in 21 localities between 3600 and 5000 m.

In northern Argentina it also occupies parts of the altiplano and high cordillera (Blake 1977), and on the Tranque de Caritaya also in Chile, where it was recorded by Johnson (1965) at 3600 m, and by Fjeldså (1987) in desert puna at Cota-Cotani (Laguna Parinacota) at 4000 m.

For Colombia and Ecuador less information is available, and is rather different from that given above. In Colombia Hilty & Brown (1986) state that *B. polyosoma* usually occurs near or above the tree line on open mountain slopes between 1800 and 3200 m (and probably higher), while *B. poecilochrous* occurs between 900 and 2000 m (and probably higher); and that both species may be migrants as neither has been recorded breeding. In Ecuador, Chapman (1926) gave records of *B. polyosoma* from the coastal lowlands up to 3937 m, and of *B. poecilochrous* at 3937 m. Marchant (1960) recorded *B. polyosoma* breeding in the arid coastal lowlands.

### Summary of habitat selection

In the geographic zones where *B. polyosoma* and *B. poecilochrous* coincide, they tend to be segregated spatially. The former species occupies a greater diversity of habitats (open or wooded) over an ample altitudinal range, from the Pacific coast or Chaquean lowlands up to the altiplano. *B. poecilochrous* frequents open habitats on the altiplano and in the high Andean mountains, between c. 3600 and 5000 m; it has also been recorded in the local and now much reduced high-altitude *Polylepis* woodlands. On the Bolivian altiplano *B. polyosoma* is a solitary winter resident and is found on flat areas. *B. poecilochrous* is a permanent resident, often in pairs and generally associated with rocky hills and mountains with cliffs.

### Acknowledgements

I am grateful to Dr Ovidio Suarez and Prof. Gastón Bejarano for the use of facilities during our stay in Bolivia; to the Spanish Ambassador, D. Tomás Lozano, for his support and cooperation; and to Antonio Jimenez Lara, who accompanied me on many excursions to the country. J. V. Remsen supplied information on specimens collected in Bolivia and deposited in the collection of the Louisiana State University Museum. J. Barreiro, curator of the vertebrate collection of the Museo de Ciencias Naturales de Madrid, allowed me to study the skins in his care. Aid from Instituto Español de Emigración y de Cooperación Técnica Internacional financed my stay from 1981 to 1986. The association 'Amigos de Doñana' financed my travel and living expenses in August and September 1988. J. Fjeldså reviewed the manuscript and provided useful advice.

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## On the occurrence of the Black Stork *Ciconia nigra* in West Africa

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Received 22 February 1991

The Black Stork *Ciconia nigra* has probably been uncommon in West Africa throughout the century. Its main breeding range in the Palaearctic is located east of 16°E, and the isolated, and declining, population in Iberia is partly sedentary (Cramp & Simmons 1977). West Africa proper lies between 16°W and 10°E. Brown *et al.* (1982) map the Black Stork as occurring right across West Africa between approximately 11° and 15°N. They also state that it is scarce in West Africa, though it enters the continent through Gibraltar and also crosses the Mediterranean on a broad front. The decline of the Western European population prompted Moreau (1972) to suggest that "the scanty records in West Africa may never be augmented now . . .". This forecast has, happily, proved to be unduly pessimistic. Since 1965 there have been published and unpublished reports of Black Storks in five West African countries, while recent aerial surveys, reported below, provide records for six countries. In one or two localities Black Storks, though never common, have occurred with some regularity.